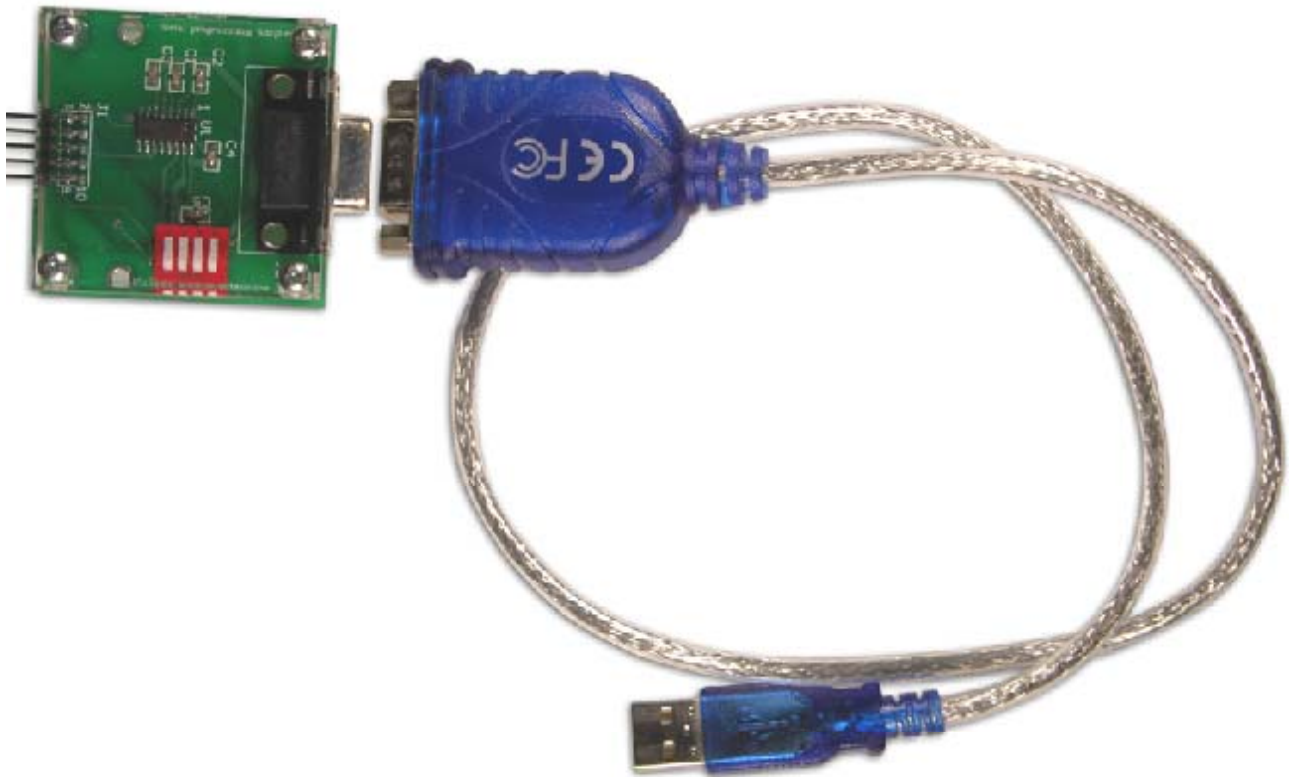


**USER GUIDE**  
**PC Serial Programming Adapter Cable for Fujitsu**  
**Flash Microcontroller-**  
**F<sup>2</sup>MC-16LX/FR Family**

P/N:  
Fujitsu Microelectronics America, Inc.



## Revision History

| Revision # | Date       | Comment   |
|------------|------------|---|
| 1.0        | 03.25.2001 | New Document  |
| 2.0        | 08.21.2003 | Added devices in the Table  |
| 3.0        | 04.11.2005 | Added devices in the Table and modified the layout of the document. |
| 4.0        | 01.30.2006 | Added USB to serial cable description                               |

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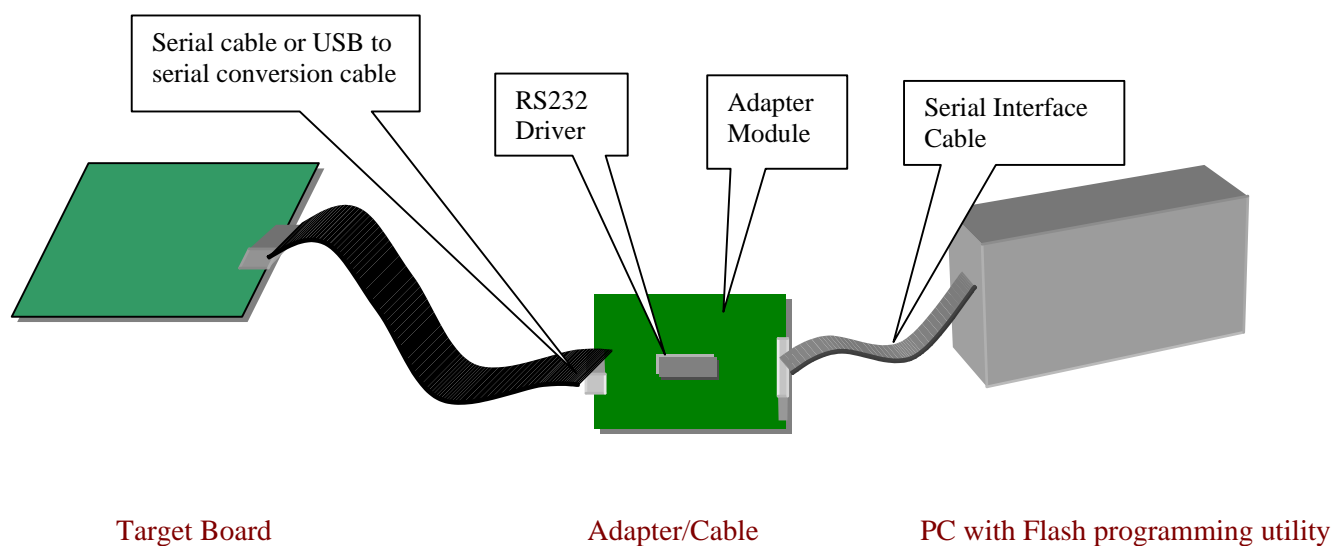
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## Overview

This document is intended to give an idea about in circuit serial programming of the Fujitsu F<sup>2</sup>MC16LX/FR family flash Microcontroller using an adapter cable. This method allows the user to program the microcontroller directly on the target system without additional RS232 circuit. This solution saves some space on the target board and minimizes the cost of the system required for serial programming.

## Serial Interface of the Microcontroller to the PC via Cable

The diagram (figure1) below gives brief idea about all-necessary connections, which has to be done to program the on chip Flash memory.



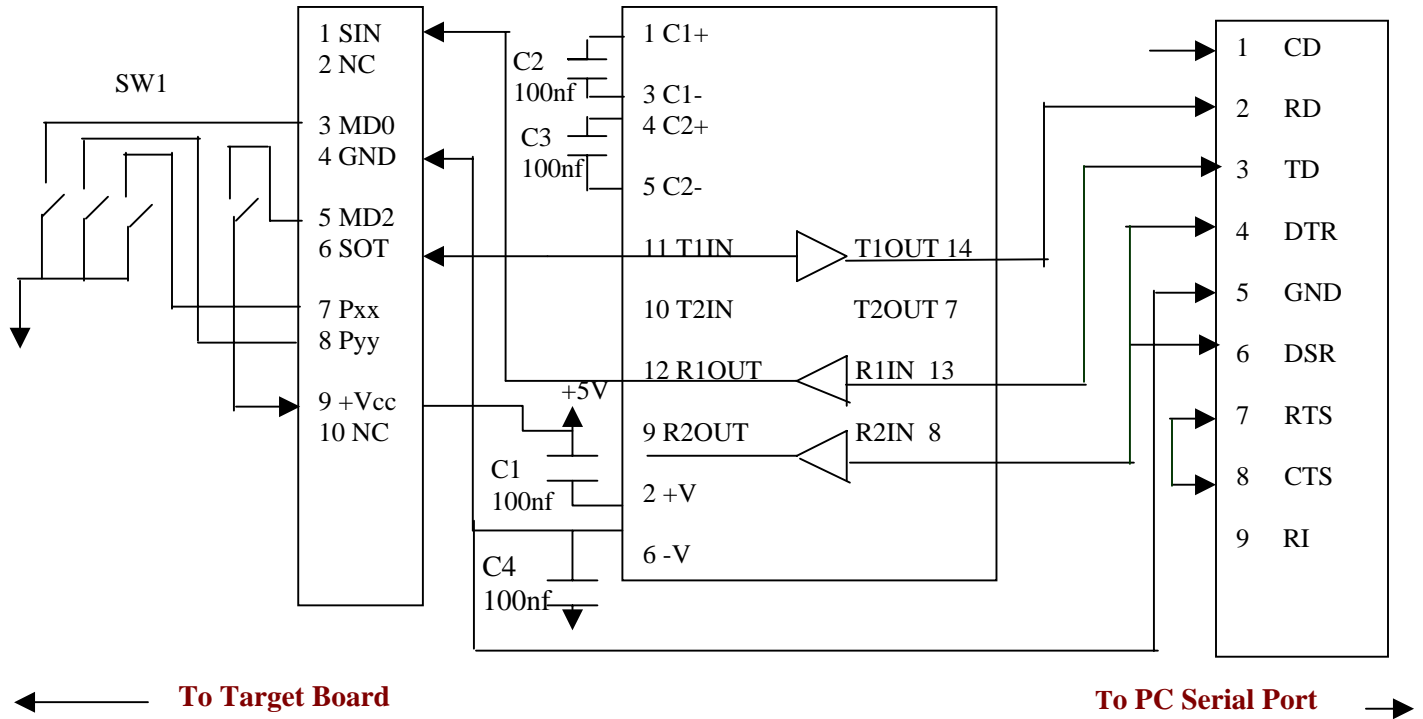
**Figure 1- Interface Diagram**

Fujitsu standard Serial programming utility provides the asynchronous method to program the microcontroller. In order to connect the Microcontroller on board to the utility software, only the serial interface lines SOT (Transmit) and SIN (Receive) are necessary. On the PC side to establish a connection to the Microcontroller the RTS and CTS line should be connected together. The DTR should be connected to the DSR line in order to avoid the communication error. The RD line has to be connected to the SOT, and the TD line has to be connected to the SIN via the RS232 driver to the microcontroller for voltage level conversion.

The above whole connection requires the extra component such as RS232 driver and supporting components for driver on target board. The adapter cable eliminates the above component requirement and provides the complete solution. Hence no need of extra component on the user system for in circuit programming the Flash Microcontroller.

The Schematic of the adapter cable is shown in figure 2.

**Figure 2: Flash Adapter schematic Diagram**



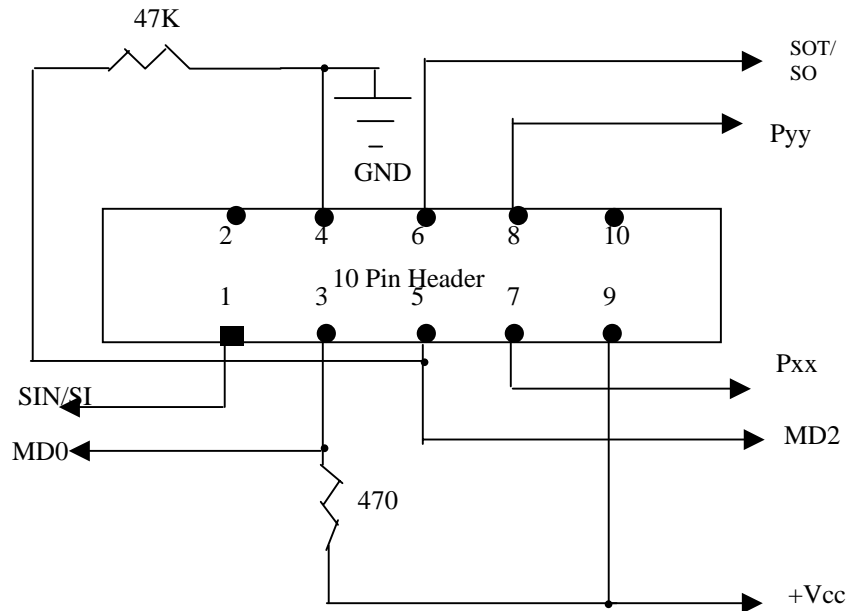
## Procedure for Hardware/Software Setup of Flash Adapter

The following steps are required to set up the Hardware and software of the flash programming adapter.

1. Download the FLASH programming utility from the CD.
2. Connect one side of the ribbon cable to Adapter (J1) and other side to the user target board (Note: The user board should have the 10-pin header for the cable). The pin outs for the header is shown in the figure 4, and table1).
3. Connect '9 pin serial cable' or 'USB to serial cable' on one side to the adapter cable (J2) and other side to the PC.
4. Set all DIP switches SW1 (MD0, MD2, Pxx, and Pyy) position to ON. Pxx and Pyy pins are corresponds to the pins listed in the Appendix A and B for starting pin for programming.
5. Connect the power supply to the target board (Power supply on the adapter board comes from the User target Board via header).
6. Launch the flash programming utility on the PC.
7. Select the devices from the CPU list, and select the COM port (It depends on which port serial cable is connected).
8. Switch on the power supply. Execute the < download> command from the Flash-programming interface.
9. If download is okay select the .mhx file (this file has been created after compiling the program) from the user application software. Now select the <auto> command. A complete programming sequence will be executed (Erase complete flash memory, blank check write file to flash memory and verify data). These commands can be executed individually as well.
10. After successful execution of this command, set all the DIP switches to OFF, or disconnect the programming cable.
11. The power on reset or pressing the reset button on target board will start the application in the flash memory.

## Requirement on Customer Target Board

In order to connect the adapter cable to the target board, it is required to have the 10-pin standard IDC header on the target board with the connection shown below. Figure 3 shows the connections from the microcontroller to header. For detail pin out refer to Appendix A/B.



**Figure 3: Schematic Diagram on the Target Board**

### Note:

- Pull up and pull down resistor value shown above in MD0 and MD2 line is for reference only. It is recommended to connect the low value of pull up resistor (Approx 470 ohm) to mode pins if required or connect these pins directly to Vcc or Vss directly as per the logic shown in the above diagram. MD1 should be connected to the power supply on the target board, as there is no change in the signal status for normal and flash-programming mode.
- The schematic diagram shown above is for reference only. If necessary, consider the 10-pin header pin out as a top view.
- Pxx and Pyy is the starting pin for programming. Please refer to appendix A and B for more detail about this.



**Table 1: Pin Description of Header on the Target Board**

| Pin No. | Description | Details   |
|---------|-------------|---|
| 1       | SIN/SI      | Connected to the SIN of the Microcontroller. Refer table-2 shown below. |
| 2       | NC          |   |
| 3       | MD0         | Connected to the MD0 pin of the MCU                                     |
| 4       | GND         | Ground of the Target board and MCU                                      |
| 5       | MD2         | Connected to the MD2 pin of the MCU                                     |
| 6       | SOT/SO      | Connected to the SOT of the Microcontroller. Refer table-2 shown below. |
| 7       | Pxx         | P00 of the MCU  |
| 8       | Pyx         | P01 of the MCU  |
| 9       | +Vcc        | Supply to the MCU   |
| 10      | NC          | -   |

## **Appendix A**

### **MCU Pins used for Flash asynchronous Programming in F2MC Family**

## Microcontroller pins used for Serial Programming

| Type                                   | Serial Data Input Pin | Serial Data Output Pin | Starting Pin for Programming Program | Supply Voltage |
|--|-----------------------|------------------------|--------------------------------------|----------------|
| MB90F334                               | P42/SIN0              | P43/SOT0               | P60=L, P61=L                         | 3-V product    |
| MB90F347/C/S/CS                        | P82/SIN0              | P83/SOT0               | P00=L, P01=L*1<br>P00=H, P01=L*2     | 5-V product    |
| MB90F352/C/S/CS                        | P12/SIN3              | P13/SOT3               | P00=L, P01=L*1<br>P00=H, P01=L*2     | 5-V product    |
| MB90F372                               | P70/UI1               | P67/UO1                | P00=L, P01=L*1<br>P00=H, P01=L*3     | 3-V product    |
| MB90F387/S                             | P40/SIN1              | P42/SOT1               | P30=L, P31=L                         | 5-V product    |
| MB90F394/H                             | P36/SIN0              | P34/SOT0               | P00=L, P01=L*1<br>P00=H, P01=L*2     | 5-V product    |
| MB90MF408                              | P82/SIO               | P84/SO0                | P80=L, P81=L                         | 3-V product    |
| MB90F423GA/GB/GC                       | P03/SIN1              | P04/SOT1               | P00=L, P01=L                         | 5-V product    |
| MB90F428GA/GB/GC                       | P03/SIN1              | P04/SOT1               | P00=L, P01=L                         | 5-V product    |
| MB90F438L/LS<br>MB90F439/S             | P43/SIN1              | P45/SOT1               | P00=L, P01=L                         | 5-V product    |
| MB90F443G                              | P43/SIN1              | P45/SOT1               | P00=L, P01=L                         | 5-V product    |
| MB90F455/S<br>MB90F456/S<br>MB90F457/S | P40/SIN1              | P42/SOT1               | P30=L, P31=L                         | 5-V product    |
| MB90F462                               | P40/SIN0              | P41/SOT0               | P00=L, P01=L                         | 5-V product    |
| MB90F474H/L<br>MB90F476/A              | P70/SIN0              | P71/SOT0               | P80=L, P81=L*1<br>P80=H, P81=L*2     | 3-V product    |
| MB90F481                               | P70/SIN0              | P71/SOT0               | P80=L, P81=L*1<br>P80=H, P81=L*3     | 3-V product    |
| MB90F482                               | P70/SIN0              | P71/SOT0               | P80=L, P81=L*3<br>P80=H, P81=L*2     | 3-V product    |
| MB90F497/G                             | P40/SIN1              | P42/SOT1               | P00=L, P01=L                         | 5-V product    |
| MB90F498G                              | P40/SIN1              | P42/SOT1               | P00=L, P01=L                         | 5-V product    |

## Microcontroller pins used for Serial Programming

| Type           | Serial Data Input Pin | Serial Data Output Pin | Starting Pin for Programming Program | Supply Voltage |
|----------------|-----------------------|------------------------|--------------------------------------|----------------|
| MB90F523B      | P42/SIN0              | P43/SOT0               | P00=L, P01=L                         | 5-V product    |
| MB90F543/G/GS  | P43/SIN1              | P45/SOT1               | P00=L, P01=L                         | 5-V product    |
| MB90F546G/GS   | P43/SIN1              | P45/SOT1               | P00=L, P01=L                         | 5-V product    |
| MB90F548G/GS   | P43/SIN1              | P45/SOT1               | P00=L, P01=L                         | 5-V product    |
| MB90F549/G/GS  | P43/SIN1              | P45/SOT1               | P00=L, P01=L                         | 5-V product    |
| MB90F553A      | P42/SIN               | P41/SOT                | P00=L, P01=L                         | 5-V product    |
| MB90F562/B     | P60/SIN1              | P61/SOT1               | P00=L, P01=L                         | 5-V product    |
| MB90F568       | P60/SIN1              | P61/SOT1               | P00=L, P01=L                         | 3-V product    |
| MB90F574/A     | P40/SIN0              | P41/SOT0               | P00=L, P01=L                         | 5-V product    |
| MB90F583B/C/CA | P40/SIN0              | P41/SOT0               | P00=L, P01=L                         | 5-V product    |
| MB90F584C/CA   | P40/SIN0              | P41/SOT0               | P00=L, P01=L                         | 5-V product    |
| MB90F591A/G    | P36/SIN0              | P34/SOT0               | P00=L, P01=L                         | 5-V product    |
| MB90F594A/G    | P36/SIN0              | P34/SOT0               | P00=L, P01=L                         | 5-V product    |
| MB90F598/G     | P43/SIN1              | P45/SOT1               | P00=L, P01=L                         | 5-V product    |
| MB90F654A      | P40/SIN0              | P41/SOT0               | P00=L, P01=L                         | 3-V product    |
| MB90F804       | P54/SIO               | P56/SO0                | P65=L, P66=L*1<br>P65=H, P66=L*3     | 3-V product    |
| MB90F867       | P82/SIN0              | P83/SOT0               | P00=L, P01=L*1<br>P00=H, P01=L*2     | 5-V product    |
| MB90F897/S     | P40/SIN1              | P42/SOT1               | P30=L, P31=L                         | 5-V product    |

## Appendix B

### MCU Pins used for Flash asynchronous Programming in FR Family

## Microcontroller pins used for Serial Programming

| <b>Type</b>                  | <b>Serial Data Input pin</b> | <b>Serial data output pin</b> | <b>Starting pin for programming program</b> |
|------------------------------|------------------------------|-------------------------------|---|
| MB91F109                     | SI0/PF0/TRG0                 | SO0/PF1/TRG1                  | P20, P21                                    |
| MB91F133                     | PI0/SIN1                     | P11/SOT1                      | P20, P21                                    |
| MB91F233                     | P00/SIN0                     | PO1/SOT0                      | P10, P11                                    |
| MB91F264                     | P20/SIN0                     | P21/SOT0                      | P44, P45                                    |
| MB91FV310/F312               | SI0                          | SO0                           | P33, P34                                    |
| MB91F353/F355                | PH3/SI3                      | PH4/SO3                       | PN0, PN2                                    |
| MB91F362/365/366/367/368/369 | SIN0                         | SOT0                          |   |